

The rite of passage

By Bill O'Brien

Brand new aviation mechanics, like novices in every other profession or trade, must sooner or later go through a rite of passage. The rite is the first, lonely step we all must take if we wish to change our status from apprentice mechanic to aviation professional.

For one mechanic the rite of passage may be completing his first unsupervised engine overhaul and finding no problems. For another, the rite may consist of standing all alone on the side of the runway, quietly whispering a small prayer as her first "100-hour" takes off.

But for the majority of us the rite of passage is far less dramatic. The first "rite of passage" more frequently consists of successfully filling out your first FAA Form 337 for a major repair or a major alteration. And it's much more enjoyable if you avoid becoming known by the FAA inspectors at the local FSDO as the resident airport idiot.

What makes filling out a Form 337 so difficult lies in the fact that there's not a lot of public information out there on the FAA's rules, policies, and procedures that a technician should use to do it right. So finding your way around the Form 337 for the first time can be very difficult.

The FAA has plenty of internal guidance for FAA inspectors on performing major repairs and alterations, but there is only one advisory circular for mechanics; AC 43.9-1E explains how to fill out the FAA Form 337 blocks, but it provides little else in the decision-making process.

In the interest of preventing new technicians from following in my early career foot steps, I have created a Form 337 Checklist, if you will, in the hopes you won't stumble over the same rocks in the road that have my name engraved on them.

I will follow each question in the checklist with enough background information, and appropriate FAA references, to help shed a little light on this ambiguous process and help you choose the right path to take. Let's begin:

The scary Baron scenario

You are handed a work card by your boss and he points toward a Beech Baron, and says: I want the aircraft out the door in two days!" You look at the work card and begin your decision-making process:

Is the work to be performed a repair or alteration?

This question sounds so basic, that it almost seems to be an insult to technicians to mention it. But maybe it's not all that basic! At times it is a valid question. If you look in FAR 1 Definitions, the definition for a minor repair/minor alteration tells us that a minor repair/alteration is something that is NOT a major repair or major alteration.

If that is not a lot of help, in the same part, the definition of a major repair and a major alteration are identical, save for a 12-word preamble at the beginning of the definition of major alteration that states that if the alteration you are going to perform is identified on the aircraft, engine, or propeller, type certificated data sheet, specification, or listing, the alteration is minor. So not a great deal of help is there.

To better explain the difference between the two, I must fall back on my first and best explanation on the difference between a repair or alteration. It is a lesson taught to me by the first IA that I worked with, Jack Dunkle, who worked for Delaware Aviation, at North Philadelphia Airport. He explained the difference between the two this way: "Listen up, O'Brien. If you put it back the way it was, it's a repair! If you changed what it was, it's an alteration."

For 30 years, I never had the difference between a repair and an alteration explained to me in such a concise, and supremely elegant way!

Is the work going to be major or minor?

Not an easy question to answer because a lot of gray areas exist around the definitions of the two words. But the answer to this question will decide if only a logbook entry (ref: Section 43.9) is required, as in the case of a minor repair/alteration or a Form 337 is required to be filled out for a major repair/alteration.

The first FAR reference you want to check is Appendix A of Part 43. It identifies a lot of major repairs and alterations by airframe, powerplant, components, etc. But a good part of the time, you may not find your particular repair or alteration listed at all.

This does not mean the repair or alteration you are working on is not a major; it only means your repair or alteration is not listed in the 31-year-old Appendix A. So you still have to figure out if you have a major repair or alteration to work.

I have a couple of alternative solutions to help you decide on how to answer question No. 2. First, you could contact the local FAA district office and ask for some help in making the determination of major or minor.

Some mechanics would rather eat a year-old burrito stuffed with fiber-glass and garnished with a Skydrol dressing, than to give the FAA a call, but it is still a good idea to bring them into the picture and make them your Form 337 partner, instead of your judge when you send them the signed copy of the Form 337 for their review.

The second solution I have found works about 95 percent of the time. You ask yourself three questions. It goes like this: "Could the repair or alteration I have just performed fail in such a way that would prevent a continued safe flight? Could it prevent a safe landing? And could it fail and adversely affect the safety of the crew, passengers, or people on the ground?"

If any of the three answers to the above questions are a "yes," you have either a major repair or major alteration.

What kind of "data" do I have to use to perform this major repair or major alteration?

Before we get into the approved and acceptable data debate, let's see what data is. Data is information! It can be design drawings, photographs, reports, instructions, electrical load charts, weight and balance reports, etc. that are accurate, complete, and appropriate to the repair or alteration.

However, the data, in whatever format it comes in, can only supply you with two types of information. The data can talk to "airworthiness" or type design (ref: FAR 21.31) or it can talk to "performance" such as methods, techniques, and practices which explains how to perform the repair or alteration (ref: 43.13).

By understanding this concept of two types of data, you can then see how easily the concept fits into the definition of "airworthy" which is when an aircraft or component part meets its type design (airworthiness) and is in a condition for safe operation (performance). Which happens to be exactly what all completed major repairs and major alterations must be: "airworthy."

The types of data can be broken into two kinds: FAA acceptable and FAA approved. FAA acceptable data is any data that can be used for all kinds of maintenance such as 100-hour inspections, minor repairs, or minor alterations. The big exception is you cannot use acceptable data for major repairs or major alterations.

Some examples of acceptable data is manufacturers' maintenance manuals, bulletins, AC 43.13.1A and 2A, Part 121 and Part 135 operator's manuals, and other FAA field-approved FAA Forms 337 based on data approval, or physical testing or inspection.

FAA-approved data can be used for both minor and major repairs or major alterations, but in the real world it is used primarily for major repairs or major alterations. Some examples of approved data are type certificate design information, airworthiness directives, STC, appliance

manufacturers' manuals, CAA Form 337 dated prior to Oct. 1, 1955, SFAR 36 data, DER data, and anything stamped FAA approved.

If you only have acceptable data, (e.g., manufacturer's service bulletin) and you have a major repair or major alteration, then you need to get the acceptable data, FAA approved.

How can I get my acceptable data FAA approved?

Getting acceptable data FAA approved is called a field approval and it is an FAA policy by which a trained and qualified FAA Aviation Safety Inspector, Airworthiness, at the local FSDO is authorized to perform three kinds of field approvals.

The first field approval the inspector can perform is "approving acceptable data only." The second approval the inspector can perform is to "approve" an installation or repair based on physical inspection, demonstration, or testing. The third kind of field approval is the examination of data only, for a duplication of a major repair or major alteration on identical aircraft by the original modifier.

This last field approval I have nicknamed the poor man's STC because you cannot sell the data, or the Form 337 by itself to another individual. The multiple installation privilege is tied to the original modifier only, and only he can make money from doing the work.

Am I guaranteed an FAA Field Approval?

No! Please remember even if your Form 337 is perfect, the FAA inspector is not required to sign Block 3 of the Form 337. This FAA policy respects the individual decision-making capability of the FAA inspector to determine if he or she has the background, training, experience and trust in the major repair or major alteration you submitted to sign Block 3 of the Form.

If your inspector is not qualified in Piper Tri-pacers and tells you so, then try another inspector who knows where Piper hid the master switch on that particular aircraft.

Where else can I go to get data approved?

You can contact a designated engineering representative, who for a fee, will stamp "DER Approved" on your acceptable data. However, remember that DERs have different "ratings." A structures DER cannot "approve" powerplant repairs or alterations and neither can a Powerplant DER approve data for structures. Also a DER cannot issue a Field Approval — in other words sign Block 3 of the Form 337, only the FAA inspector can. For some installation you might use two or three DERs to approve all the data for your repair or alteration.

Is there any other place I can go to get data approved?

Depending on the type of aircraft and the kind of repair to be made, an IA or FAA-approved repair station can use AC 43.13-1A Acceptable Techniques and Practices, Aircraft Inspection and Repair, to "approve" the acceptable data in the AC.

This acceptable repair data in the AC can be "approved" if the IA or certificated organization finds that the repair data is "appropriate" to the repair, directly "applicable" to the repair, and not "contrary" to the manufacturer's data.

With the big AC 43.13-1B revision coming out at the beginning of next year, there will be one more added requirement to the "AC data approval" process. The certificated individual or organization who signs off Block 7 must ensure that the data found in the AC, that in addition to meeting the first three requirements, they must list the chapter, page, and paragraph number in the AC that "they" are approving.

Self-approving AC 43.13-1A data does not require any other FAA formal review process, other than the standard review that takes place when any completed Form 337 is sent to the FSDO. By

the way, the authority for an IA or FAA certificated organization to “self-approve” acceptable data in the AC is found on the first page of the AC, sometimes referred to as the signature page.

How many kinds of “approved” data am I allowed to list on my Form 337?

You can list an infinite number of “approved” data sources, from airworthiness directives, to DER data, to FAA field-approved data on Block 8 of the form as long as the combined data is complete, accurate, and is applicable to the repair or alteration you are going to perform.

What happens if I am halfway through working either a major repair or major alteration and the boss says: “Put the Baron back together again. The owner, Doctor Poole, wants to fly to Hilton Head island for a round of golf.” Now what?

Obviously, if you are halfway through a major repair, it is very unlikely or practical that you can stop, let alone declare it as airworthy with half of the major repair accomplished. So the good doctor will miss his game, or find another form of transportation. But if you are working a major alteration, you can sign off an incomplete or piecemeal installation if:

1. The alteration data has been FAA-approved.
2. The incomplete or piecemeal alteration has been determined to NOT affect the safe operation of the aircraft.
3. The equipment installed is deactivated and has safeguards and placards to prevent its use.
4. The weight and balance records reflect what equipment is installed.
5. You must make a maintenance record stating what equipment is installed, and other work that was accomplished. You should state that the incomplete/piecemeal installation does not reflect a hazard to safe flight, and explain the placards or steps you took to render the equipment inoperative.
6. Notify the owner/operator of the incomplete installation.

One of the drawbacks to piece-meal or incomplete installations is the additional time and costs to the customer, plus the fact that in many cases, before you approve the aircraft for return to service a second time, a complete conformity inspection of the installation must be performed to ensure airworthiness.

I just installed an autopilot with glide-slope coupled STC and it was a major alteration. How do I handle the STC installation manual’s flight test requirement on the Form 337 when I don’t fly?

In this particular case, after installing the autopilot and performing all the rigging and ground checks that you can do on the ground, you can sign Block 7 of the Form 337 and “approve it for return to service.”

However, in order for the owner or operator to “return the aircraft to service,” you must state in the Form’s Block 8 (description of the work to be performed) that a test flight must be accomplished, and it must meet the requirements of Section 91.407, operation after maintenance, preventive maintenance, rebuilding, or alteration.

This rule, in a nut shell, says that if a flight test or operational test is required, then at least a rated, certificated private pilot will make an operational check of the autopilot installation, test all its functions, and if satisfied, sign the logs that the aircraft is “returned to service.”

I made some “minor” changes to the autopilot installation that I have been working on. Does this require another field approval?

In most cases a minor alteration to “approved” data that does not affect safety will not require a field approval or any other kind of FAA formal approval. However, you are required to list all deviations from approved data, no matter how small, on the back of the Form 337 (ref: FAA Order 8300.10, Vol 2, pages 1-5)

OK, I got the Form 337 signed off by my IA. What happens next?

Make a couple of extra copies of the Form 337. Keep one for yourself. It's not required by the FAA, but it is your proof of your rite of passage. I still have every one that I worked. The other copy you are required to send to the FAA FSDO within 48 hours, and the original is required to go to the aircraft's owner.

Please make sure that all the appropriate Form 337 Blocks are either checked or filled out including the tiny, obscure block that says "approved" at the top of Block 7.

By the way, for you IAs out there, here is a little Form 337 trivia. If you are not happy with a major repair or major alteration performed by a mechanic or certificated organization, you can check the "Rejected" box at the top of Block 7. Fill out and sign the rest of Block 7 as you would normally when you are approving an aircraft or component for return to service and send it into the FAA FSDO with a note why you rejected the major repair or major alteration. You can still count the rejected Form 337 as a mark on the bark toward your IA renewal, and maybe in the process, you prevented either lousy workmanship or an unsafe repair or alteration from finding a tie-down spot on the flight line.

Why all this double checking? First, a major repair or a major alteration is a MAJOR maintenance action. This is safety of flight stuff, and should not be taken lightly!

Second, an FAA inspector will review the entire Form 337 sent to the FSDO to ensure that everything is as it should be. The inspector confirms the validity of the Form 337 review by entering the FSDO office identifier and the inspector's initials in the box at the top right corner of the form.

Around 1988 there was an additional Form 337 requirement added to Appendix B of Part 43 with which mechanics must comply. If you performed a major alteration to fuel tanks or systems such as adding ferry tanks to the passenger compartment, or wing lockers, then you must make an additional copy of the Form 337 and display it in the aircraft's cockpit or cabin so U.S. Customs or Drug Enforcement Agency folks won't impound your customer's airplane, and throw him in the pokey where he would spend the night thinking bad thoughts about his mechanic.

On the average it takes about 10 working days after you send the Form 337 to the FSDO to find out if you passed your first rite of passage. If you hear nothing from the feds — you passed. However, if the feds call you up and want you to come in for a friendly chat, you can bet the contents of your toolbox that you are about to experience a different kind of rite-of-passage — one that I am sure you won't be bragging about on the hangar floor.

Someday, when you and I know each other better, ask me how I know about these things.